

[057]

CLAIMS:

What is claimed is:

- 1 1. An audible alert device for generating a pulse width modulated
2 signal, the audible alert device connectable to a power source, the audible alert
3 device comprising:
4 a circuit including a pulse width modulated signal generator; and
5 a transducer conductively connected to the circuit.
- 1 2. The audible alert device of Claim 1 further comprising the circuit and
2 the transducer at least partially enclosed within a housing.
- 1 3. The audible alert device of Claim 1 wherein the pulse width modulated
2 signal generator further comprises:
3 a first square wave frequency timer for generating a pulse width modulated
4 signal;
5 a second square wave frequency timer for generating a square wave; and
6 a duty cycle controller for controlling a decibel output level of the transducer.
- 1 4. The audible alert device of Claim 1 wherein the circuit further
2 comprises a feedback signal processor conductively connected to the pulse width
3 modulated signal generator.
- 1 5. The audible alert device of Claim 1 further comprising:
2 an output current sensor conductively connected to the transducer, for
3 sensing a resistance at the transducer and generating a signal representative of
4 transducer output current level;
5 a feedback signal processor including;
6 a feedback signal generator conductively connected to the output current
7 sensor for generating a signal representative of transducer output current level; and

8 a resonant frequency peaking circuit for processing the signal representative
9 of transducer output current level and generating a feedback signal representative of
10 transducer output current level, the pulse width modulated signal generator
11 responsive to the feedback signal to generate a pulse width modulated signal at a
12 resonant frequency.

1 6. The audible alert device of Claim 1 further comprising:
2 an output current sensor conductively connected to the transducer, for
3 sensing a resistance at the transducer and generating an analog signal
4 representative of transducer output current level;
5 a feedback signal processor including;
6 a feedback signal generator conductively connected to the output current
7 sensor, the feedback signal generator including an analog to digital converter for
8 converting the analog signal representative of transducer output current level to a
9 digital value representative of transducer output current level; and
10 a resonant frequency peaking circuit conductively connected to the pulse
11 width modulated signal generator for processing the digital value representative of
12 transducer output power level and generating a feedback signal representative of
13 transducer output current level, the pulse width modulated signal generator
14 responsive to the feedback signal to generate a pulse width modulated signal at a
15 resonant frequency.

1 7. An audible alert device for generating a pulse width modulated
2 signal, the audible alert device connectable to a power source, the audible alert
3 device comprising:
4 a transducer;
5 a circuit including a power conditioning circuit conductively connected to the
6 transducer; and
7 a pulse width modulated signal generator conductively connected to the
8 transducer, the pulse width modulated signal generator including a first square wave
9 frequency timer for generating a pulse width modulated signal, a second square

10 wave frequency timer for generating a square wave and a duty cycle controller for
11 controlling a decibel output level of the transducer.

1 8. The audible alert device of Claim 7 further comprising the circuit and
2 the transducer at least partially enclosed within a housing.

1 9. The audible alert device of Claim 7 further comprising:
2 an output current sensor conductively connected to the transducer, for
3 sensing a resistance at the transducer and generating a signal representative of
4 transducer output current level;
5 a feedback signal processor including;
6 a feedback signal generator conductively connected to the output current
7 sensor for generating a signal representative of transducer output current level; and
8 a resonant frequency peaking circuit for processing the signal representative of
9 transducer output current level and generating a feedback signal representative of
10 transducer output current level, the pulse width modulated signal generator
11 responsive to the feedback signal to generate a pulse width modulated signal at a
12 resonant frequency.

1 10. The audible alert device of Claim 7 further comprising:
2 an output current sensor conductively connected to the transducer, for
3 sensing a resistance at the transducer and generating an analog signal
4 representative of transducer output current level;
5 a feedback signal processor including;
6 a feedback signal generator conductively connected to the output current
7 sensor, the feedback signal generator including an analog to digital converter for
8 converting the analog signal representative of transducer output current level to a
9 digital value representative of transducer output current level; and
10 a resonant frequency peaking circuit conductively connected to the pulse
11 width modulated signal generator for processing the digital value representative of
12 transducer output power level and generating a feedback signal representative of

13 transducer output current level, the pulse width modulated signal generator
14 responsive to the feedback signal to generate a pulse width modulated signal at a
15 resonant frequency.

1 11. A method for manufacturing an audible alert device includes the steps
2 of:

3 manufacturing a programmable audible alert device circuit including a
4 memory device;
5 connecting the programmable audible alert device circuit to a transducer;
6 installing the programmable audible alert device circuit and transducer in a
7 housing;
8 casting the programmable audible alert device circuit in a sealing fluid;
9 connecting the audible alert device to a device programming station; and
10 programming the audible alert device.

1 12. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of manufacturing a programmable audible alert device circuit
3 includes manufacturing a circuit including a pulse width modulated signal generator
4 conductively connected to the transducer, a power conditioning circuit conductively
5 connected to the pulse width modulated signal generator, a power conductor,
6 conductively connected to the power conditioning circuit, an output current sensor
7 conductively connected to the transducer, a feedback signal processor connected to
8 the output current sensor and a memory device conductively connected to the
9 feedback signal processor.

1 13. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of connecting the audible alert device to a device programming
3 station includes connecting the audible alert device to the device programming
4 station by one or more power conductors of the programmable audible alert device.

1 14. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of programming the audible alert device includes transferring
3 operation mode data to the memory device, the operation mode data representative
4 of pre-selected operation mode data selected from a group data for operating
5 audible alert devices.

1 15. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of programming the audible alert device includes transferring
3 resonant peaking subroutine data to the memory device.

1 16. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of programming the audible alert device includes transferring
3 decibel peaking subroutine data to the memory device.

1 17. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of programming the audible alert device includes conducting a
3 resonant peaking subroutine.

1 18. The method for manufacturing an audible alert device of Claim 11
2 wherein the step of programming the audible alert device includes conducting a
3 decibel peaking subroutine.

1 19. A method for operation of an audible alert device in a normal
2 operations mode includes the steps of:
3 powering the audible alert device;
4 monitoring an output current;
5 conducting a dynamic resonant frequency peaking subroutine;
6 conducting a dynamic decibel peaking subroutine ;
7 initiating generation of a pulse width modulated signal; and
8 outputting the pulse width modulated signal at a transducer.